

THE

June, 1955

CHEMIST

VOLUME XXXII



NUMBER 6



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(See page 201)

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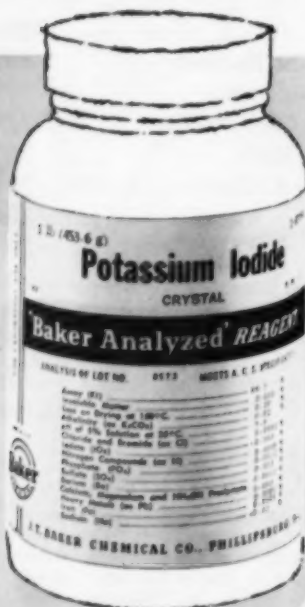
TO COME IN JULY

More of the excellent papers presented at the Annual Meeting will appear in July. These include the paper by Dr. George L. Royer, entitled, "Sizing up Members for the Team," which reveals the psychological techniques used in the employment interview. If you interview applicants or are to be interviewed you will learn much that is helpful. • D. H. Killeffer, in "Working with Technical Writers," shows why writers can help scientists even when the scientists are gifted with literary talent. • Dr. Paul D. V. Manning, Hon. AIC, discusses "The Chemist and his Personality" and points out practical ways in which individual members can carry out AIC objectives, and have fun doing it!

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EDITORIAL

Report to the Membership of The American Institute of Chemists

Dr. Donald B. Keyes, F.A.I.C.

Retiring President of The American Institute of Chemists

THE AMERICAN INSTITUTE OF CHEMISTS is the only organization in the United States whose sole purpose is to raise the professional status of the chemist and chemical engineer.

Thus it is in the best position as a national organization to organize and coordinate the efforts of those individuals who sincerely wish to en-

rich the lives of all chemists and chemical engineers by making the professions of chemistry and chemical engineering even more respected than they are today.

Your president wishes to express his sincere appreciation of all those members who during this past year have contributed so generously of their time, thought, and energy to the activities of our INSTITUTE.

New Officers

THE following new officers were announced at the thirty-second Annual Business Meeting of THE AMERICAN INSTITUTE OF CHEMISTS, May 12, 1955, in Chicago, Ill.:

President, Dr. Ray P. Dinsmore, Hon. AIC, of Goodyear Tire and Rubber Company, Akron, Ohio.

President-elect, appointed to fill

the unexpired term of Dr. Dinsmore, John H. Nair of Thomas J. Lipton, Inc., Hoboken, N. J.

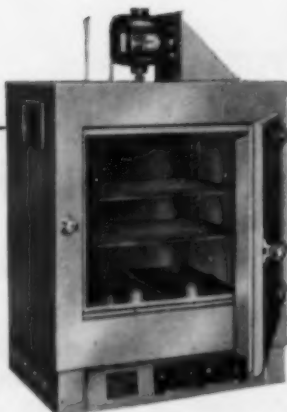
Councilors: Dr. Lloyd A. Hall of the Griffith Laboratories, Chicago, Ill., Karl M. Herstein of Herstein Laboratories, New York, N. Y., and Dr. George L. Royer of American Cyanamid Company, New York, N. Y.

Change of Name: For American Locomotive Company, Schenectady 5, N.Y., to Alco Products, Inc., to reflect the diversified operations which have grown beyond its role as a leading locomotive supplier.

To Europe: Dr. Eduard Farber, F.A.I.C. He will visit in Bad Pyrmont and Weisbaden, Germany; in Zurich, Switzerland, and in Stockholm, Sweden. He plans to return in July.

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Experiences with Students in Chemistry

Dr. Carl S. Marvel, Hon. AIC

Research Professor of Organic Chemistry, University of Illinois, Urbana, Ill.

(Excerpts from the acceptance address when the author received the Gold Medal of THE AMERICAN INSTITUTE OF CHEMISTS, May 12, 1955, at Chicago, Illinois.)

IT IS INDEED an honor to be chosen by THE AMERICAN INSTITUTE OF CHEMISTS which stresses the full recognition of the individual chemist for his achievements rather than promotes the general standing of chemistry as a science and profession. Since this medal is given for service to chemistry, it must have come to me because of my activities as a teacher of chemists, since I am certain that my most important contribution to chemistry has been in helping good youngsters see the fun and future in chemical work.

It may be interesting to report on my own conversion to chemistry, since this may have been the event which has made me realize that a lot of students can be influenced to become chemists if given a little personal attention. My parents, who were farm people, felt that education was important even for a prospective farmer and sent me to high school and college. In high school I took the classical course, but because an uncle told me the next generation of farmers would need to know some science, I shifted to a scientific course in college.

A new young instructor full of

enthusiasm for chemistry and with a real liking for people had just taken over the Chemistry Department at Illinois Wesleyan University the year I started college. He interested me in the field and made it pleasant to learn the fundamentals of the science. More than that, he put me to work as a teaching assistant and introduced me to independent research work. But even then I would have returned to farming, had he not told me in my senior year that he would be able to get me a scholarship to do graduate work at the University of Illinois. When my father heard that I might get such an offer, he urged me to accept it at once, saying, "If they are willing to pay you to go to school, maybe you will get a good job out of this after all." So I went to graduate school and became a chemist, thanks to Dr. A. W. Homberger who took enough interest in me to find me the scholarship. I have tried to repay this debt to him by giving the same sort of help and advice to my own students.

Students, even able ones, who come to college with the specific aim of becoming chemists, still need this kind of help. Nothing pleases a

student more than to have a teacher stop at his laboratory bench, call him by name, ask him about someone or some place in his home town and thus let him know that he is personally known by the teacher. From a few such meetings, it is easy for the student to feel he may come for advice on his problems whether they be professional or personal and a teacher can learn the potentialities of his students in a very real way.

I have seen students who were struggling along in school without much progress who responded to such personal treatment in a most amazing fashion. Particularly I recall a lad who had been on scholastic probation for two and a half years of college work who suddenly took an interest in his work and shifted in one semester from a C— to a B+ or A— student. He did so well in his last year and a half that he could be recommended for advanced study and he is now a highly respected research director of a progressive company. Another lad was dropped from school twice during his first two years before he became acquainted with one of the faculty who took a personal interest in him. This resulted in his return to college and to chemistry and a remarkable development into one of today's top chemical executives. Nothing seems to take the place of the personal relationship between teacher and student and this is increasingly difficult to maintain with our present large enrollments.

It is significant that today more and more of our advanced students in chemistry come to the universities from the small colleges. Relatively small colleges are turning out a larger number of majors in chemistry than are the big schools. At Illinois we have fewer seniors majoring in chemistry and in chemical engineering today than we had when there were half as many undergraduates in our school. The same is true of many other large schools. This indicates that in the smaller colleges where instruction is more nearly on a personal basis, the chemistry teachers are interesting their students in the subject to a greater extent than is being done in larger places.

We hear repeatedly that our entering freshmen are poorly prepared in science. It is used as an excuse for the high failure rate in beginning university science courses. This is not a valid excuse. We should be able to adjust our beginning courses to our students when we know the high school science teaching is not always what it should be because of the low salaries paid to high school teachers. If we are realistic in our approach, we in the colleges will set out to make our subjects interesting to students no matter what their background. Once a student becomes interested and finds he can understand the material which he needs to learn to become proficient in the field, there is little problem in teaching him the more difficult phases of our subject.

Until he does develop an interest in the subject, it is extremely easy to drive him out of our courses by making him feel he has no chance to develop himself. Since it seems unlikely that we can find quickly a method of making science high school teaching an attractive position for able people, the apparent manner in which we must procede to increase our waning supply of chemists is to give extraordinary attention to our beginning college courses. If we can sell chemistry to more of our general elementary students, we can increase the number of technical men in the higher classes. The problem will become increasingly serious since not only is it going to be extremely difficult to replace our remaining able high school science teachers, but we can also see the same problem coming in the small college field. Able chemists who could make excellent teachers are turning more and more to industry because they can not live on college or even university salaries.

I am glad to be part of a faculty which over the years has tried to maintain a reasonably close relationship to the students in our field both at the undergraduate and graduate level. This has given our alumni a feeling toward the faculty that has been described as a family feeling and a loyalty to the faculty which we all enjoy. At the same time there is no faculty worship which sometimes seems to hinder a student more than it can help him. Our students regard

the faculty as humans who make mistakes the same as they, the students, do but recognize also the effort the faculty members put into their professional work and try to follow in that path.

For many years we have recommended to our undergraduate students that they take advanced study elsewhere and have in turn sought our graduate students from other schools. We believe this exchange of students is good for the schools and for the students. The ability of a man to adjust himself to a new set of conditions is one of the factors that will greatly influence his success in life. A student who does well at two different schools can be more safely recommended than can one who has adjusted to only one faculty. The exchange of points of view that new students bring to a school helps keep the faculty on its toes as well as train the students themselves.

We have found that it is desirable to have our undergraduate students undertake a research problem in their senior year. Nothing seems to give a student enthusiasm for his subject as much as does this feeling that he may be able to contribute to it. Likewise we want new graduate students to start research at an early stage of study. This is partly to get them more directly in contact with a faculty man who will have their interests in mind and partly to keep up their enthusiasm for original work.

The question of what type of re-

search work should be assigned to students is always important and critical. It has been the general feeling among my associates that the problem should fit the student and be designed to train him. We do not believe the problem should be selected because it will necessarily advance the standing of the professor. The primary object of undergraduate and graduate research should be the training of men. If it does not at the same time add new facts and new ideas to the general field of chemistry, it is probably not too satisfactory. Yet the emphasis in selecting a problem should be on the interests of the man who is to work on it. He should have some successes and he should have enough problems to show the road is not all easy. If he has too many problems, frustration takes the place of enthusiasm. Some balance is needed to keep a man progressing so that he gains the proper respect for his work and faith in his own ability.

Because it is so important to have a close personal relationship between student and instructor, we have always allowed students to select their own research director. We want this choice to be made after the student has arrived on the scene and has met the teaching faculty. New students are therefore brought in on teaching assignments and scholarships rather than research assistantships to as great an extent as possible. This avoids competitive bidding for students and insures that the stu-

dent works for a person with whom he can feel at ease.

Occasionally we find a good student with fine qualities who has obviously got into chemistry by mistake and is not really interested in the field. Or a student may get involved in courses for which he has no natural aptitude. We always try to help such people without too much regard for exact rules and usually we can get them on the right path without too much serious damage to their morale. Decisions in such cases are often made by the faculty involved, not at a formal session but over the coffee table where so many of the faculty gather for a short informal session each morning and afternoon. These informal faculty meetings make it possible to settle many important problems in a manner which could never be achieved in a formal gathering. In these discussions we keep in mind the best interest of the student and make program changes with that interest in mind. We have even got students new jobs at other colleges when for some reason things were not going well and yet the student obviously had the stuff from which good results could be expected under proper conditions. Many of these shifts have turned out exceptionally well and chemistry generally, as well as the students, has gained by the changes made.

It is often most important to a student to have some faculty man

indicate that the faculty has faith that the student is a good man and that we believe he can develop. This applies to excellent students as well as some whose grades show less evidence of their real ability. This year I found a man who had entered our graduate college in September with a straight A undergraduate record who had got a bit discouraged about his work because he felt he was not quite as interested in fundamental research as he perhaps should be. He had about decided a man should not be in graduate school unless he was intending to become the purest of pure scientists. When in discussion I told him that many of our Ph.D.'s found many ways to use their talents in industry and most are not fundamental research scientists, he took hold of his work again with all the enthusiasm that he had shown as an undergraduate. I predict he will be one of the leaders in

the chemical industry in the next generation. But he might have been lost to the industry if some one had not taken the time to tell him some of the simple truths which are often overlooked.

I believe our students learn a little more than mere chemistry in their contacts with the faculty. They learn to respect the field of chemistry and learn the importance of participating in activities which promote the profession. They have a genuine interest in those societies which are necessary to keep the profession alive and growing. At nearly any professional meeting we find a good representation of our graduates who are in attendance and who are active in the affairs of these societies. They also take on their share of the committee work of the government agencies and in general we feel they learn to be good citizens of the chemical world.

Dr. Carl S. Marvel

Dr. W. H. Lyman

Vice President and Director, Johnson & Johnson, New Brunswick, N. J.

(Presented when Dr. Marvel received the Gold Medal of The American Institute of Chemists, May 12, 1955, Chicago, Illinois)

THIRTY-FOUR years ago this fall some forty or fifty corn-fed Illinois boys and girls walked into Room 211 in the Old Chemistry Building in Urbana to see for the first time the open friendly face of Carl Shipp

Marvel. The word, "open", is used in the sense of without guile. Certainly he did not look much like the traditional college professor and there may have been some among us in that 1921 class in beginning organic



Dr. Ray P. Dinsmore, new AIC President, Dr. Carl S. Marvel, and Dr. William H. Lycan.

chemistry who wondered whether he could teach.

Fortunately, we quickly learned that Dr. Marvel was, as he has remained to this day, an exceptionally fine teacher. He lectured in plain, direct language, understandable and interesting, without apparent effort. In the years when I came to know him better, I learned that the easy lecture style was not nearly so easy as it seemed. Neither then nor in the thousands of lectures which have followed has he found an easy answer to the stomach butterflies that accompany his appearance on the lecture platform.

This may surprise those who have

heard him lecture in his free and easy way on various polymer problems or on the synthetic rubber program. That it always seems easy is a tribute not only to his knowledge of his subject but to the careful thought that he has given as to how it may best be presented. He always knows what he is saying and the audience likewise is permitted to know. He never loses an audience.

To go back again to 1921, that was the second corn-fed class to appear before the new and almost equally corn-fed professor. Dr. Marvel had received his degree a year earlier and had at that time published only two or three papers, those in

company with Dr. Noyes, Dr. Adams, and Dr. Oliver Kamm. In these and in the pattern of his early following papers, the character and purpose of his research career began to appear. Consciously or otherwise, it was designed primarily as a vehicle for the teaching of a profession. Only after that primary purpose could be satisfied did contributions to the organic chemical literature and the enhancement of his own professional reputation appear to receive serious consideration.

When I said, "consciously or otherwise", I reserved credit for the meritorious approach of the young Marvel to his teaching responsibilities. I doubt if he thought seriously about it then or has dwelled on it long in the years that followed. It seems more likely that he was doing what comes naturally rather than following the high road. He was as interested in people as he was in organic chemistry. Because he has remained genuinely so through the years and because he has grown as much in his capacity for friendship and interest in chemists as in professional stature, he is the honored guest of The American Institute of Chemsits at this presentation.

It is not to imply that in his preoccupation with teaching, Dr. Marvel has not amply contributed to organic chemistry in its years of greatest growth. In his early work on organic chemical reagents, he helped provide essential tools of our trade,

vital to organic research whatever its purpose, academic or industrial. In the middle twenties, he nodded fleetingly at the syntheses of hypnotics and anesthetics, popular subjects at the time, and then went quickly on into the broader fields of more lasting theoretical and practical significance. His works on syntheses of amino acids, on organo-metallic compounds, on hexarylethanes, on polyines and other acetylenes, on quaternary ammonium salts, on hydrogen bonding involving the carbon-hydrogen link have not only been effective vehicles for teaching the techniques of organic chemical research but have greatly enhanced its literature.

Finally, there is the vast amount of work which he has done in the field of polymerization. No one has contributed more to the knowledge of the processes of polymerization and no one has sent more real "pros" into the industrial laboratories where knowledge of these processes has counted most. The honors that these scientific contributions have brought to Dr. Marvel include election to the National Academy of Sciences, presidency of the American Chemical Society, the Nichols Medal, the Willard Gibbs medal, and many others.

Having passed lightly over the scientific contributions and having faced the East with respect to the honors they have brought, I should like to mention other important matters. Not about "Speed" Marvel's graduate



*Dr. Donald B. Keyes, Dr. Carl S. Marvel, and Dr. Foster D. Snell
at the Medal Presentation.*

school days and the part he had in the beginnings of Organic Preps. or Organic Chemical Manufactures as it was more formally called. It would not be right to tell about the manufacture of phosgene during World War I and the fact that phosgene could not legally be shipped from one place to another. Speed never evaded the law—he just bought a day coach ticket to wherever it was consigned and carried the phosgene with him in glass bottles. The law didn't say anything about that.

Not about his poker playing — Speed has probably clipped more young chemists at poker than any living professor. This contributes to their knowledge of economics and keeps them in the laboratory when they might be out running around with girls.

Not about his bird watching—un-

fortunately he does everything well and the birds that he hasn't listed in that little black book of his aren't in anybody's little black book. They haven't grown wings as yet.

Not about his hunting and fishing—he doesn't do much of the former now although there was a time when he could walk the five miles from Lincoln, Illinois, on the Illinois Central, to his father's farm at Waynesville, hunt all day and walk back to Lincoln for the evening train home.

Nor about Farwell's either, where Speed is dean of the coffee table, although that is getting closer in a sneaky sort of way. Farwell's is an institution almost as much a part of Illinois Chemistry as the immortal odor of Noyes' laboratory. It is a restaurant across the street where at mid-morning and mid-afternoon staff and students gather for coffee and

conversation and to relax and to discuss chemistry and football and sex and last night's poker game and almost every other subject under the sun. Speed is almost always there and has been for the thirty years or so that I have been going back to Illinois.

Farwell's is getting close to the other important matters I want to mention, the informality of Illinois and the building of lasting relationships between faculty and students and among the students themselves. It is close because the gatherings there are spontaneous and informal—nobody comes because Speed is there, or Bob Fuson, or Fred Wall, or anybody else. They all come because it is fun to come and that is all there is to it.

Not quite all, because the same informality is characteristic of all student-faculty relationship in chemistry at Illinois. There are few who will not agree that Speed Marvel has for thirty years been the keystone of that characteristic informality. It is not familiarity and familiarity has no part in it. If there is anything in all this hullabaloo about "human relations in research" which industry has discovered in the last few years, industry has not read the prior art. Speed Marvel discovered it about thirty years ago and has been practicing it ever since.

I would like to lay odds that Speed Marvel can tell you the name, location, professional connection and cur-

rent field of interest of every living Ph.D. student of the more than one-hundred and ten who have studied under him. Furthermore, I would like to lay odds that Speed has had a hand in furthering the professional interests of most of them whether they are in industrial or university work. Nor has he limited the benefits of his wide influence in professional American chemistry to his own students.

Among others, I myself owe a debt of great gratitude to Speed for advice and for far more tangible help in my professional career. There are few among the host of chemists trained under any professor at Illinois in the past thirty years who will not say the same thing. So it has been with members of the staff at Illinois and with chemists at du Pont and elsewhere Speed has done consulting work or has otherwise had contact with them.

In short, few men have been as diligent and effective as Speed Marvel in promoting the interests of our profession.

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Motivation of Production People

Mark E. Putnam

Executive Vice President, The Dow Chemical Company, Midland, Michigan

(Presented at the First Professional Session of the AIC Annual Meeting, May 12, 1955, in Chicago, Illinois.)

IN GENERAL, most human actions are the result of motivations of one sort or another. Quite simply, we turn up the heat if we are cold; turn it down if we become too warm.

More complex actions, or courses of action, generally imply more subtle or complex motivations—often too subtle and complex to be recognized or understood by the individual himself. Yet when we become concerned with influencing the actions of others we must inevitably try to set up motivations that will result in the action we desire.

This is the particular province and problem of management people, and the extent to which one responsible for group activities can understand and appreciate motivations very largely determines the effectiveness of his direction.

Historically, and with notable exceptions, supervisory people were inclined to a much oversimplified view of job motivations. The more idealistic were inclined to the notion that if you paid a man well enough you would command his appreciation and therefore his best efforts. The opposite school was represented by the old bull-of-the-woods type foreman who relied largely on a loud voice, rough language and threats of harsh

discipline or job loss to inspire his charges to greater effort. I once knew a gang boss who used to brag that he always had three crews, one going, one coming, and one working. This was reasonably effective, if inhuman, so long as the work involved could be performed by relatively unskilled labor and there were an ample number of men on the outside looking in.

More recently there was widespread acceptance of a reverse view that security rather than insecurity was the key to successful motivation. Instead of threatening to fire a man we must do everything possible to make him feel secure in his job, in his home life, in all his relationships.

Actually, all of these are possible work motivations, but we have finally come to recognize that they cannot be ascribed really major importance either singly or in combination. Motivations go deeper, are more complex, and often vary considerably with the individual.

The element of coercion is virtually out the window. The protection of labor organizations and the enlightenment of management have largely eliminated it. At the same time, increasing skills have dictated higher educational levels and increased on-

the-job training. Even if management were entirely free to do so it would think twice before firing a man not easily replaced.

Security we have found to be all right so far as it goes. It may engender a happy and contented attitude, but this *per se* does not necessarily make an employee diligent or creative.

Remuneration is much in the same boat. It contributes to contentment but not necessarily to productivity or creativity. While an underpaid employee may be marginally productive because he is discontented we cannot increase a man's productivity proportionately simply by increasing his earnings. At least we cannot do it for long, for a given level of wage or salary quickly comes to be taken for granted. Further, we find that as we go up the scale of education and intelligence money assumes less importance as a motivating factor.

For example, many years ago I worked for a time as a chemist in a Portland cement plant in Dallas, Texas. Heavy rains caused a flood of the Trinity river which drove some 2,400 people, mostly negroes, out of their homes. Relief stations were set up to feed these people. Many workers in the plant who lived in areas not affected by the flood quit their jobs and patronized the relief stations as long as they could. As long as they could manage to subsist without work, money obviously was not sufficient motivation to keep them on the job.

On the contrary, we see all about us executives and scientists who work very hard, to whom the remuneration, even though large, cannot be of major importance. I should fancy that once a man has acquired a million or so he cannot feel greatly dependent on his paycheck. Other motivations, therefore, must be responsible for the fact that he works diligently at least eight, and more likely ten or twelve, hours a day.

In view of the tremendous possibilities as far as industry is concerned, not to mention the welfare of the individual, motivation is entitled to much more careful study than it has had in the past.

Many years ago I was riding on a train with a man who was then president of a small chemical company which manufactured chlorates by an electrolytic process. This company is no longer in existence. During our conversation he expressed the opinion that there was no good reason why his company should not have grown large like Dow except that he could not seem to get good young men to stay with him. He seemed to have no idea why this was. I am sure it was not a matter of salary. I believe his company was handled in such a way that the men involved could see little ahead except monotonous work. They doubtless felt a lack of opportunity, appreciation and importance. At Dow men were made to feel that the project they were working on was their own. They were encouraged

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to try out original ideas, that the possibilities were unlimited, and that as the projects developed and grew they would grow with them. Had his men had similar motivations, the whole story of that company might have been vastly different.

We do not know much about motivations, but we do know that they have to go beyond salary and security. One motivation that is effective in some instances is competition. Competition was exploited years ago in the lumbering industry. Men would work like horses simply to cut more timber than a neighboring camp. It can be employed successfully by industry today in certain circumstances. For example, our own company functioned for years with an accident frequency rate of about 22, which was a fair average for the chemical industry at that time. We had a safety program, but try as we might with regulations, machinery guards and threats, we were not able to better this record very much. Since no one really wants to get hurt, we were assuming also that a man's own welfare should be some inducement to safe practices.

Eventually, however, we discovered that while individual welfare was sufficient motivation for some men, the majority were inclined to be indifferent. Others, meanwhile, would follow strong leadership, and the great majority responded to group competition. Recognizing these characteristics, we set up a system of re-

wards for departmental superiority. With this we have been able to drop our frequency rate at the Midland plant, which employs around 9,000 people, to 1.35 and hold it at approximately that figure. Where we formerly had about two fatalities a year we have recently gone as long as three years without a single fatality. The notable point is that we have done this with the same safety director and virtually the same engineering standards. We had simply found a more effective motivation for safe conduct.

We have likewise employed competition effectively in other directions. It was notably successful in solving a serious quality control problem some years ago in which the men competed not against each other, or against another department, but developed a tremendous spirit of teamwork in attaining a goal. Competition has on numerous occasions worked for us in stimulating research by the simple expedient of assigning an identical problem to two or more research teams and allowing them to work out their own solution.

Probably the most effective motivations, and I think this is especially pertinent to technical people with whom we are primarily concerned, lie somewhere in the area of job satisfaction. Men just naturally work more diligently, more imaginatively and creatively if they get satisfaction out of their work. The problem, from the standpoint of manage-

ment, is to determine what will result in this job satisfaction.

All individuals do not respond in the same manner. To one, satisfaction may require some form of recognition; a pat on the back from the boss, or the presentation of a paper at a meeting of colleagues. To another it may require a feeling that his work is important. Another may simply feel inner satisfaction at having done a job well; and still another may feel satisfaction only if he is convinced he is running his own show . . .

To the extent that a man feels he is doing something on his own instead of assisting someone else, he will often be more effective. Obviously the latitude a man can be permitted depends to some degree upon his own ability and responsibility and upon the nature of the work involved, but we have made every attempt to capitalize upon this freedom in the Dow company.

As a rather extreme example, I well remember my own first experience there. Previously, while teaching at Case, I had done consulting work for the company, so I was not an entirely unknown quantity to Dow management. In any event, upon my arrival in Midland, Dr. Herbert Dow said, "Well, we will have to find you a place to work." We went out into the plant and found a vacant building. Dr. Dow told me to order whatever I felt was needed in the way of laboratory equipment to fit it out.

I naturally asked what he wanted me to work on.

"It seems to me," he replied, "that a good organic chemist should be able to *find* something to work on." That is about as much latitude as any man can expect, and I was highly pleased. I studied the company's raw material and production structure on one hand and the market possibilities for various products on the other. The result was Dow's entry into the field of salicylates. Typically, having developed the processes, I found myself responsible for production. Like many another Dow man I was allowed to grow with the project.

In greater or lesser degree this same sort of thing has happened over and over again in the Dow organization. We allow our people as much freedom as we possibly can to work in the direction of their own interests and develop their own ideas. In fact, we frequently have difficulty in getting new men to understand and take advantage of this freedom. They are confused by the absence of arbitrary boundaries.

I do not suppose this method of operation is generally regarded as good business practice. But it is excellent human relations and has worked out well for us in a business sense. A few years ago *Forbes* published a list of the seventeen best buys in stocks thirty-five years before — that is the seventeen stocks which had shown the greatest total return in dividends and increased value over

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the thirty-five year period. Dow was second on the list, with IBM placing first. So our policies, if unusual, have paid off in growth and profits.

What of some of the other components of work satisfaction that are important to motivation? First of all, certainly, there must be a feeling that the work is important. Nothing destroys motivation more quickly than a feeling of futility. Consider the disillusionment of a man who is asked to prepare some lengthy and time-consuming report or compilation of data and then, upon presenting it, is told, "Never mind. We won't need that after all." If this sort of thing happens very often he will get the feeling that nothing he does is worth the trouble, and if this is true, why trouble.

This is a negative illustration. Looking at the positive side, however, it should be recognized that the importance of certain tasks is not always readily apparent. The smart supervisor will be alert to these situations and find means of convincing those under him of the importance of the work they are doing.

Finally, recognition is usually essential to work satisfaction. Few people are so introverted that they are content to labor if no one seems to care, or is even aware, of their successes and failures. True the hobbyist may build a beautiful ship model chiefly for the inner joy of having created something well with his own talents, but his pleasure is still mul-

tiplied when someone compliments his skill and his accomplishment.

Recognition can take many forms and is perhaps the area in which we can work most successfully and imaginatively in furthering work motivations. In the first place, there is a bit of the snob, or at least a desire for individuality, in all of us. For example, we have a group of about two-hundred and forty men doing analytical work. Their skills and responsibilities vary considerably. To the extent that they are all classified simply as "chemists" the better ones become unhappy, with decreased productivity, despite the fact that their salaries, in general, vary in keeping with their skills and responsibilities.

Recognition of work, accomplishment and ability, however, is probably more crucial, and while the supervisor is in the key position here more remote company policies and practices can contribute to a man's feeling of recognition. To have one's work observed, understood, and appreciated by one's superior is of prime importance to most people. Carried a step further, when a man is consulted by management, when his opinion or advice is solicited, he not only feels a keen sense of recognition, but feels also that he is participating in the decisions of management. There is a great difference in motivating effect between simply saying, "Joe, I want you to do so and so," and saying "Joe, how do you think we

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should do so and so?" Even though Joe's advice may have to be amended, an understanding supervisor can do so without destroying Joe's feeling that he has contributed something to the solution of the problem.

Technical people particularly can also find recognition, if they are permitted to publish papers dealing with their work and are encouraged to attend meetings of appropriate technical societies. Work importance, as well as the recognition, is also implicit in such activities. So while these activities are more commonly thought of in terms of broadening a man's knowledge they can also be instrumental in spurring him to further accomplishments.

These are only a few of the things that go into the process of motivating a man. I assume that management is responsible for developing the greatest possible motivation and seeing that this motivation is used to the advantage of the individual as well as for the employer. In order to do this, he must know the individual sufficiently well to understand his interests and ambitions, which factors of work-satisfaction he places highest. Finally, he must demonstrate to the individual that his suggestions are for the good of the individual as well as for the company.

As we learn more of the techniques of motivating people, I am sure we shall uncover and activate a great deal of power that today is only latent.

Evaluating Commercial Chemical Development

Dr. Thomas H. Vaughn, F.A.I.C.

*Vice President, Research & Development, Colgate-Palmolive Co.,
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and

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(Presented by Dr. Vaughn at the First Professional Session held at the AIC Annual Meeting, May 12, 1955, in Chicago, Ill.)

How do you measure the effectiveness of commercial development? Which of its results are the better "yardsticks"? Are its results adequately represented by the volume of sales or the number of new products established? Is it fair to use such criteria when they include factors that are often beyond the control of the commercial development program? If, on the other hand, results are evaluated by a subjective opinion of whether "they are doing a good job," an extraneous factor of the supervisor's opinion is introduced. The results then are no longer what is a good job, but what the supervisor considers a good job. Certainly the assessment of results must be put on a more objective basis than this — but how do we do it?

Let us start by first considering the major responsibilities of most commercial chemical development departments (abbreviated CCDD). These almost always include market development, company development, and often market research. The de-

partment may also be responsible for economic analyses and industrial intelligence. To use functions instead of titles, the CCDD is usually responsible for, (1) determining whether a market exists for a new product and estimating the size of this market at various price levels, (2) the introduction and initial sale of new products, and (3) various special studies into the commercial aspects of the company. Even a brief study of these functions brings out the first important point in evaluating CCD. Although the members of this department frequently use sales techniques, their basic function is not that of sales, but of research. Each of their duties is a research job. Even market development can be understood best by considering it research work done in the field, each customer contact constituting an experiment.

No one tries to evaluate research solely in terms of the dollars of sales produced. There are too many management decisions, independent of the

data obtained either by technical or commercial research, which affect the results, expressed in terms of sales. As examples, there may not be enough money available to follow to commercialization a favorable market research report, or a market development project may be abandoned halfway by a shift in company policy on its areas of interest. For this reason we must evaluate the results of CCD one step removed from sales volumes. The place where the performance of CCD is not obscured by factors beyond its control is the place to measure its effectiveness. In this case we must measure its success in meeting its objectives.

First, let us look at another factor in evaluating development results, one that may not be immediately apparent. This factor is "chance." In most jobs, the opportunities for decisions arise so frequently that the effect of chance can be minimized. Thus, a salesman makes many calls on many prospects to discuss many products. Any difficulty he may have with a specific purchasing agent, the wrong thing said to a specific research director, are usually balanced out by harmonious contacts with other prospects. Management makes so many decisions in a day that a few mistakes are compensated for by the better-than-average decisions. Even if a manager has a relatively bad day for unsound decisions, it is only one day in many and its effect is eventually diluted.

The CCDD seldom has this opportunity for mass decisions. Selecting one choice from among many is always its major problem. It must select the projects on which to concentrate, it must select the approach to use, it must select the prospects to call on, it must select the information it will accept or reject, and finally, it must select a recommendation to present to management. Thus, the decisions usually come in a series and any error along the way is emphasized rather than compensated for. A single wrong decision early in the project can cripple it. Chance, of course, will come into operation where a large number of projects are handled, but most development departments handle only a few projects at any given time. Management must therefore consider the element of chance in evaluating the results of any single project, or even evaluating results over any short period of time, such as one year.

Now let us consider the principal "raw results" obtained by the CCDD. These are the completed reports for market research, market development or special projects, together with the sales records on new product introduction. An analysis of these results may show three levels of accomplishment.

The minimum acceptable level of accomplishment is obtaining the correct answer to the problem. In market research, this would be an accurate survey of the market. In mar-

ket development, it would be an accurate estimate of the size of the market that exists at any given price level. For new projects, it might be an accurate estimate of the investment required, and so on.

Above average performance consists of doing this work with a minimum expenditure of time and money. In market development, for example, one group might be sure that a market does not exist after an investment of three months and \$12,000. Another group might come to the same conclusion after two years and \$80,000. The company made no money in either case. Therefore, in an evaluation based entirely on sales results, these groups would be considered equally poor. Yet there is an important difference in effectiveness between them. This can be emphasized by stating that the profits shown by the groups were -\$12,000 and -\$80,000 respectively — and this neglects time. The first group is actually better by \$68,000 and 21 months.

A superior development group not only makes an accurate estimate in minimum time and expense, but by its enthusiasm, sales ability and special knowledge, provides the company with valuable additional benefits. These benefits may be of immediate financial value, as in the cases of turning up new, related products for specific markets or in showing that the broader specifications obtainable

at lower cost are acceptable to the prospects.

There are also important indirect benefits. One of these is improved company reputation and relations within the industry. While the salesman represents his company with the prospect's purchasing agent, it is the development man who does the representing with the prospect's technical and management executives. His personal reputation for integrity, perhaps tested every day by his market development promises, is naturally considered a reflection of the company's integrity. The contact between the development representative and the prospect is often of a delicate nature. Most of the information exchanged is confidential. The manner in which the development representative conducts himself can have a profound effect on future business relations.

Another aspect of the effect of the CCDD on company relations in the industry concerns the introduction and promotion of new products. Obviously, the prestige of any company is affected by the number and type of new products that are introduced. This is usually beyond the control of the CCDD. However, the CCDD usually is responsible for the new product advertising and promotional literature. The quality of these, the type of information included and the extent of distribution are important factors in creating an impression of the company among its prospects.

Improved intra-company relations are an indirect benefit that may be difficult to measure in spite of their importance. The CCDD is the only one in the company, outside of top management, that combines the attitudes of sales and research with an appreciation of the problems of production and finance. It should form a communication circuit among these various departments which are often so burdened with their own problems that they may fail to understand their true functions on the team. The CCDD can increase the interchange of ideas by acting as a catalyst and supplying and communicating an appreciation of each department's problems and capabilities.

Another duty of development is to bring in new ideas, and this is certainly one of the most difficult features of all to evaluate. The statistical technique simply does not apply to any single item, and one good idea may be worth hundreds of fair ones. Each idea takes a certain amount of time to consider, and time spent on one item is not available to spend on another. Yet many ideas must be studied, since it is seldom possible to tell in advance which will be most successful. The suggested technique of evaluation here is to consider only a certain amount of management time available for considering such ideas. The number of different ideas presented should be ignored and only the time that must be spent on each one considered. How much of man-

agement's available time is cluttered up with ideas that should have been screened out first by the CCDD? Or must additional data be requested frequently? Is a long discussion necessary because the idea was not properly clarified in advance? The answers to these questions are a rough measure of the performance of the development department in this function.

There is one additional function that management can expect from the CCDD — the production of candidates for management jobs. In many departments of a company, the duties are too specialized to give a man the broad outlook required for management. Even rotating a man through various departments only provides an opportunity to learn some of the problems of each department; there is no assurance that these will become properly integrated in the man's mind. In CCDD, however, at *one* time and in *one* job, a single man may be responsible for the financing, research, production, sales, and publicity on a product or group of products. He is, in effect, operating a small company. The CCDD is therefore unique as a training group for management. This emphasizes the need for careful selection of its personnel.

There is one last factor to consider in evaluating the performance of the CCDD, and this is a factor pertinent in evaluating the results of any department. Success must be measured

not only by the results obtained but by the obstacles to be overcome in obtaining those results. What would be good performance in one company might be mediocre in another. As an obvious example, no company would expect the same quality of results in the first year of a department's operation that it would from the same group five years later.

These obstacles to success can take many forms. There may be a shortage of competent personnel or there may be a temporary restriction in funds. It is not possible or necessary here to discuss each of these obstacles and its effect on CCDD performance. I would like to discuss, however, what many CCDD heads consider the most important obstacle to success. It may surprise you to learn that they sum this up in one word—management.

Since the commercial chemical development department is an assistant to management, gathering its facts and figures, this charge is particularly disturbing. On examination, it cannot be brushed aside as merely a misunderstanding or a breakdown of communication. As expressed by one development director, "To do our job properly, we must keep both feet planted firmly on the ground of reality, but how can we do this if the ground is constantly shifting sand?"

What can management do about it? Let us consider only those factors unique with CCD and not such standard items as adequate salary

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levels, opportunity for professional development, proper quarters, and so on. The additional requirements prove to be simple to state yet difficult to implement, because they consist largely of attitudes. There are at least three general types:

1. Provide adequate information for the department to perform its job effectively. Management has an obligation to the department head to keep him informed of the capabilities and limitations of the company to handle new projects, and to outline the company's desires as to direction and rate of growth.

2. Provide sufficient prestige for the department so that its ideas and recommendations receive respectful consideration by the heads of research, production, sales and other major departments. The results of commercial research must not be permitted to be brushed aside by the fixed ideas of men primarily concerned only with their own department.

3. Keep CCD from the day-to-day pressures of the business, particularly from sales problems. Of course, there are times when the use of the special abilities of the depart-

ment are absolutely essential, but the group must not become a fire department.

In retrospect it is evident that little has been said about how to evaluate CCDD, but rather an attempt has been made to point out what should be evaluated. There has been no question of assessing the value of the function itself. This function has more than proven itself in those companies that pioneered in the task of crystallizing the function into the responsibility of one department. In fact, its success has been so outstanding that there has been an almost phenomenal rate of formation of such departments in other companies. This has resulted in a shortage of competent and experienced personnel, and it is likely that this shortage will continue for many years. This must also be considered in evaluating the performance of the department. CCD is still a relatively new function, improved techniques are constantly coming into use, associations for the exchange of information are being formed, and there is a steady stream of helpful publications.

Management's responsibility is to foster the growth of this dynamic force. Commercial chemical development provides the vital data management needs to make decisions in an industry and economy that are becoming progressively more complex. Its evaluation is no simple

matter — but evaluate we must. The management that can evaluate objectively and can follow through on the evaluation is assured of success in this challenging area.

Appeal: To the chemical industry is being made by F. J. Emmerich, Hon. AIC, chairman of the Chemical Division of the Committee of American Industry, to support the National Fund for Medical Education, 2 W. 46th St., New York 36, N.Y.

Appointed: Dr. Louis Koenig, F.A.I.C., associate director of Southwest Research Institute, as vice president of the San Antonio research institute, where he will direct SRI's expanded chemistry, chemical engineering, minerals, metals, high energy and applied biology divisions.

Elected: A Fellow of the New York Academy of Sciences, Dr. Max Bender, F.A.I.C., senior research chemist of the American Cyanamid Company, Research Division, Bound Brook, N. J.

Appointed: Gerard B. Meynell as advertising manager of the Organic Chemicals Division and Pigments Division of American Cyanamid Company. He replaces Ernest K. Hunt who has been named public relations manager.



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Honored: Kenneth G. Mackenzie, F.A.I.C., of Old Hill Farms Road, Westport, Conn., with a Certificate of Appreciation, by the Technical Board of the Society of Automotive Engineers. He was cited for his outstanding contribution to the work of the Fuels and Lubricants Technical Committee of the Society. He has been a member of the Committee and its predecessor, the Lubricants Division, since 1923. Since 1933 he has been the representative of the American Society for Testing Materials, of which he is a past president and honorary member. He retired in 1954 after forty-three years with The Texas Company, and is now engaged in consulting work.

Elected: Lawrence H. Flett, F.A.I.C., as president of the American Section of the Societe de Chimie Industrielle, 330 West 42nd St., New York 36, N.Y. Other officers elected are: Vice Presidents, Robert S. Aries, F.A.I.C., and Jean R. L. Martin; Vice President (Canada), Jean Kern, F.A.I.C.; Secretary-Treasurer, Pierre Bouillette; and Honorary Secretary, Dr. Jerome Alexander, Hon. AIC.

Annual Meeting: Of the American Society for Testing Materials, Philadelphia 3, Pa., to be held at Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-July 1, 1955, with thirty sessions scheduled.

Controlling the Controller

Winfield I. McNeill

Management Consultant, 270 Park Ave., New York 17, N. Y.

Former Vice President and Controller for General Aniline & Film Corp.

(Presented at the First Professional Session, May 12, 1955, of the Thirty-second Annual AIC Meeting, Chicago, Ill.)

THERE have been chemists, engineers, salesmen, production people, etc., since industry has grown up, each serving a well understood professional function. But how about these comparative new comers to the business scene; accountants, auditors, controllers, treasurers? What justifies their prominence in the business structure of a modern company?

In order to set the stage for our thinking on a completely objective basis, let me quote from Elbert Hubbard's definition of a controller which (with some justification) is very real to many engineers, chemists and other professional men:

"The typical Auditor or Accountant is a Man past middle age, spare, wrinkled, intelligent, cold, passive, noncommittal; with eyes like a cod fish, polite in contact, but at the same time unresponsive, cool, calm, and as damnably composed as a concrete post or a plaster of Paris cast; a human petrification with a heart of feldspar, and without charm or the friendly germ, minus passions and sense of humor. Happily though, they seldom ever reproduce—and all of them finally go to Hell."

Having had the privilege of a chemical engineering background followed by activity in the accounting and financial sides of a business, I hope to review objectively the relations between a controller and other

people in the organization.

The terms treasurer, financial vice president, controller, auditor, mean different things to different companies. Historically the treasurer was, and still is, the top financial and accounting officer in many companies. In such a company accounting usually represents one group of the treasurer's responsibilities, while credits and collections, company financing, relations with banks, insurance, and real estate represents another group of responsibilities. In some few companies all of these duties are under the supervision of a person called "auditor." In still other companies there is a financial vice president in general charge of all these activities with two principal subordinates: a controller in charge of all accounting, and a treasurer in charge of credits and collections, company financing, etc. A more recent trend, however, in large companies, is the complete separation of the duties of controller and treasurer, both having vice presidential status and both reporting directly to the president. The principal reason for this is the belief that the person who *accounts* for the company's money should be other than the person who

actually handles the company's cash. In addition, each function requires a person with different education and experience.

The controller's Institute recommends that the duties of a controller be defined, in short form, in corporate by-laws as follows:

"The duties of the controller shall be to maintain adequate records of all assets, liabilities, and transactions of this corporation; to see that adequate audits thereof are currently and regularly made; and, in conjunction with other officers and department heads, to initiate and enforce measures and procedures whereby the business of this corporation shall be conducted with the maximum safety, efficiency, and economy. He shall attend all meetings of the Board of Directors and of the Executive Committee and he shall report to the President and/or the Board of Directors as said Board of Directors may prescribe. His duties and powers shall extend to all subsidiary corporations and, so far as the President may deem practicable, to all affiliated corporations."

In layman's English this means responsibility for:

1. Paying the company's bills.
2. Giving customers credit for payments of cash.
3. Keeping track of different classes of expense for control purposes.
4. Preparing financial statements and explaining changes.
5. Preparing tax returns and keeping up-to-date on tax laws.
6. Calculating the unit cost of products and the profitability of each.
7. Handling pay rolls and distribution of labor for cost purposes.
8. Keeping inventory and property records.
9. Assisting the manufacturing department in calculating the performance of each department

and for the factory as a whole against standards.

10. Devise or approve all clerical systems and methods.
11. Audit the accuracy and legitimacy of all items of income and expense.
12. Develop a budget which will present to management a forecast of operating results and financial conditions.
13. Be responsible for general office management of service functions.

In brief, a controller's function may be separated into two parts:

1. Collection of the actual facts of the business exactly as they happen and within a reasonable degree of accuracy.

2. Interpretation and presentation of those facts in terms of business problems for action by the board of directors, president and other officers of the company.

I would like to emphasize the words "within a reasonable degree of accuracy." Many engineers, chemists, and others think of an accountant as carrying results to six decimal places in any problem, whereas one decimal place is all that is significant. While there is, in some instances, justification for this opinion, this is not always the case, because an increasing number of accountants have the same training in the use of significant figures as the other technically trained men in the organization.

A company policy dedicated to showing the facts as they actually happen often stumbles over tax expediency. Two illustrations out of many will suffice:

1. Using rates of depreciation which do not reflect the actual useful life of the equipment, and therefore may not show the true earning power of the company.

2. The use of Lifo (last in first out) and other arbitrary methods of pricing inventories that do not represent the actual value of inventories.

Please do not infer from these remarks that I am opposed to using every legitimate method possible for saving tax dollars. It is, in my opinion, possible to show stockholders and management the real facts of the business and at the same time take full advantage of tax benefits. The controller, in trying to record the actual facts of the business, is often beset with pressures from important executives to show facts different from actual. Several actual cases will illustrate: (Please do not try to connect these to any particular company since they are drawn from several sources).

1. A vice president-general manager wanted a statement of profitability to show research and development money actually spent on a line of *unprofitable items* in his division against a *very profitable line* of products so that the loss shown by the unprofitable group wouldn't appear as great.

2. A vice president of sales who had introduced a new line of products, tried to insist on a profitability report to the board of directors in terms of gross profits—which hap-

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pened to be normal—when the application of costs for freight, warehousing, selling and advertising expense, etc. would have made the net (or real profit) very small, and much less than had been promised.

3. A works manager who had been manufacturing a raw material for plant use, instead of buying it from outside suppliers, based his cost calculation on the use of average overhead rates for the entire department instead of the actual overhead costs of the operation. When proof was submitted that the raw material could be purchased more cheaply than it could be manufactured on an "out-of-pocket" basis, the works manager did everything that he could to discredit the activities of the cost department.

4. An important executive tried to discredit the controller and the company's method used for pricing inventories, when profits were seriously affected by increased overhead costs due to a major drop in production which resulted from building inventories too high in a previous period with his approval.

You can thus see that the poor old controller, by virtue of his responsibility for uncovering the facts of the business, is continually on the firing line because facts often show poor management or poor operation of particular departments. The unfortunate result is often the generation of ill feeling and attempts to sabotage the controller, and his organization, by making them appear as glorified clerks.

One of the common traits of human nature, and incidentally one of the indoor sports of any business, is the activity of certain department heads in spending time and vocal effort in outlining how another department head should run his job.

An illustration of this occurred in a plant where historically each chemist in charge of a department had been not only foreman, but director of personnel relations, cost accountant, production planning supervisor, etc., in his particular kingdom. A works accountant was hired to install a modern cost accounting system. The previous cost method was not uniform throughout the plant and was not representative of the facts of the business. One of the department heads, who was most capable in his knowledge of operations, continually discounted the work of the cost accountant in establishing the system. (The cost accountant in this case happened to be a man who had a master's degree in chemistry, as well as being a good accountant.) Pro-

gress was retarded by this department head's insistence on installing the accounting procedures in *his* way. Because of this it was necessary to have a top level meeting in which the department head was informed that he should have the same faith in the cost accountant as a professional man, skilled in his job, as the management had faith in the department head in running his job. In other words, he should not waste his time telling the cost accountant how to run his job any more than the cost accountant should waste his time telling the department head how to make quality products.

This illustration points up a common failing among many professional men; namely, because the fact that a person may be an expert in one line often inflates his ego to the point that he considers himself capable of telling other people how to run their jobs. A ball team, in order to be good, must have not only qualified players in each position, but each player must have confidence in, and cooperate with, his team mates.

I am not unaware that too frequently the controller is actually a good bookkeeper-accountant, and that is all. He may also live up to the reputation of watching the use of pencils and neglect the more important problems.

There is, however, an important change taking place at the present time in the qualifications of a controller for a chemical or other manu-

CONTROLLING THE CONTROLLER

facturing business. An illustration:

A chemical company having sales between 50 and \$100,000,000 per year found its accounting activities not properly organized. The company had never centralized its accounting under a controller. A decision was made to employ a controller responsible to the president. The public accountants were called in to assist in finding a suitable man. Suggestions were also solicited by the president from other outside sources. The public accountants produced a most capable candidate from the viewpoint of ability to prepare financial statements, handle the details of general accounting, etc., but who was short on the side of technical understanding of a chemical business, or how to organize for effective cost accounting and cost control through the use of industrial engineered standards. The public accountants were surprised when told that the calibre of the controller candidate should be such that over a period of years he might well be considered along with others of the executive staff as a candidate for president.

The controller finally chosen from a list of several candidates was an engineer-accountant who met the requirements of the following specifications:

Specifications for Controller

Age:

35 to 50 years.

Education:

- (a) Preferably a graduate of an engineering school who has

had at least elementary courses in chemistry and/or chemical engineering.

- (b) A graduate of a course combining engineering and business subjects, or one who has done graduate work at an institution like Harvard Business School, University of Minnesota, Cornell, M.I.T., Northwestern, University of Iowa, or other similar Schools.

Experience:

Preferably one who has been in charge of cost accounting in a process industry for at least 4 or 5 years and also is familiar with general accounting practices either through actual experience as a supervisor or through some experience in the public accounting field. He should have had experience either as assistant controller in a large company for 5 to 10 years or as controller of a small or medium-sized company.

General Characteristics:

1. He should have a reputation for being cooperative and diplomatic.
2. He should be strictly honest, analytic and objective.
3. He should be a good administrator.
4. He should be a good judge of the type of men qualified to be key men in his department.
5. He should have ability to interpret the facts of the business as well as to collect facts in the most economical way.
6. He should be of sufficient stature to be considered on a par with the heads of sales, manufacturing, industrial relations, research, etc.
7. He should have some standing in the accounting profession.

Salary Range: Approximately \$25,000 per year.

It is interesting to note that the number of presidents of companies who were former vice president-

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controllers is considerable. A possible reason is that, other things being equal, a controller has some advantage over sales, manufacturing, research and development, or other executives in that his activities cover the details of the entire corporation and he is the source of many reports and recommendations which go to the president and board of directors for executive action.

The fact that technically trained men are more and more taking active roles in the executive management of businesses is causing technical schools to give consideration to the degree to which business subjects should be introduced into the curriculum.

The points which I hope will find a place in your memory are:

1. The controller of a manufacturing company is the chief accounting officer and is responsible for the preparation of financial statements, accumulation of costs, and supervision of tax accounting. His activities cover two principal functions.
 - (a) Collect the facts of the business as they actually

happen with a reasonable degree of accuracy.

- (b) Interpret those facts to the board of directors, president, and others in the solution of company problems.
2. Technical men have a tendency to discount the accounting function. This is a natural reaction to the somewhat slow transition of the accounting function from straight book-keeping to straight accounting to the broad aspects of controllership.

The controller should have professional status in a company on a par with the vice presidents of sales, manufacturing, research and development, etc.
 3. The controller of a manufacturing company, chemical or otherwise, should preferably have technical, as well as accounting education. He is thus better equipped to understand and interpret the facts at his disposal.

To Europe: Prof. A. C. Zettlemoyer, F.A.I.C., of the National Printing Ink Research Institute, Lehigh University, Bethlehem, Pa., who spoke at the Third International Conference of Printing Research Institutes in Holland, May 1-6. He will visit several universities on the continent and in England.



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New Position: For George F. Sharrard, F.A.I.C., who is now manager of the Technical Service Division of R. M. Hollingshead Corporation of Camden, N. J. He was formerly assistant to the director of sales development of Chas. Pfizer & Co., Inc.

Elected: Dr. Lloyd A. Hall, F.A.I.C., as a charter member of the Phi Tau Sigma honorary society, recently founded at the University of Massachusetts. This honor society for food sciences elected Dr. Hall "in recognition of his contribution to food sciences."

Appointed: Dr. M. J. Blish, F.A.I.C., retired research executive of International Minerals & Chemical Corp., as research consultant and coordinator to head an industry research program for the Glutamate Manufacturers' Technical Committee. The program will cover all uses and applications of glutamate in foods.

Honored: By the Italian Pharmaceutical Association, Dr. Andrew Bartilucci, M.A.I.C., assistant dean of the St. John's University College of Pharmacy, Brooklyn, N. Y., at a dinner on March 6th. He received a scroll testifying to his position as "outstanding member of the pharmacy profession and member of the Italian Pharmaceutical Association."

Announced: By Robert A. Nanz, F.A.I.C., president of Florida Chemists & Engineers, Inc., Orlando, Florida, the appointment of William C. Ford as chief chemist.

Elected: President of the Nebraska Academy of Sciences, Paul J. Stageman, F.A.I.C., of the Department of Chemistry of the University of Omaha, Omaha, Nebraska. He is the first chemist since 1932-33 to become president of the Academy.

Appointed: By Pecora Paint Company of Philadelphia, Pa., John B. Humphrey as chief chemist.

Mishandling Research People

Dr. Warren C. Lothrop, F.A.I.C.

*Vice President, Arthur D. Little, Inc. 30 Memorial Drive,
Cambridge 42, Mass.*

(Presented at the second Professional Session of the AIC Annual Meeting, May 13, 1955, in Chicago, Ill.)

IN THE course of several years of work directed to improving the relationships which the management of a company has to the research activity, or perhaps more broadly expressed, to the technical activity, a group of us have uncovered a number of rather common failures which can be properly summarized as mishandling research people. I will be frank to state some rules which seem to be well designed to produce real problems in the management-research department relationship. I hope you will overlook any resemblance in style to that of AIC president, Dr. D. B. Keyes, or to Mr. Stuart Potter, the author of "Gamesmanship," to both of whom I feel indebted for a little inspiration.

Here then is a set of nine rules or a syllabus for management which, if carefully followed, will certainly result in mishandling the technical department:

(1) Never state the corporation or research department objectives, but then complain when these objectives are not achieved.

This is a basic premise. It completely relieves the management of any responsibility for the results and yet opens the technical department to

all kinds of pressures and charges and counter-charges generally involving claims of inadequacy. Some research directors are not strong enough to force this gambit and state right at the beginning that they propose certain specific objectives, which if management does not protest, they will assume are the management objectives. It is, however, a strong man who can accomplish this.

It is easy to say that the management has no long-range plans for the company and, therefore, has not projected these into the area of research. When pressed, a company president can then finally respond with a smile that the company's objective is "to make money for its stockholders." This is, however, so obvious and pat a reply that even the most calloused executive will realize it, and be put in the uncomfortable position of having to think. Although probably it is true, it is unwise to admit that most companies tend to live by day-to-day crises, rather than by any logically developed line of future planning. The really adept mishandler, while granting that it is desirable that there should be a common meeting ground

between the technical group and the top management for a discussion of where the company is headed, will allow these to bristle with complaints from management that the department is unproductive and complaints by the department that they are not let in on the real thinking of the management or party to its planning.

(2) Always tie the research budget and personnel hiring very closely to the short-term sales picture, preferably by using some magic percentage figure.

This is an excellent way of causing trouble. In the first place, in prosperous times or following a windfall from some particularly successful development it is easy to tell the research director to double his budget, go out and hire more people, research pays, etc. This poses a real problem for the research director in times when manpower is difficult to get, salaries extremely competitive, while at the same time it is, of course, obvious to him that no research program of any value can be turned on suddenly only later to be as quickly turned off. This last angle is one that is particularly appealing to a short-sighted management. Here the temptation is very great, when sales dictate, to chop off research like a rank weed and say arbitrarily that a million dollars less is available next year, but to leave entirely to the research director the gruesome task of how this cut can be accomplished without great damage.

In the second place, most managements will find no very real problem in determining how much money for the technical activity is justifiable in their particular situation. There have, of course, been very careful surveys made (such as the Harvard Business School survey of some years ago) which are a guide in showing what the industrial and company averages are. Whether the application of such percentage figures so derived is justified to the budget of any individual company is questionable. They might not agree with Roger Williams, who has stated in his recent Perkin Medal address:

"There seems to be widespread concern that a budget which is sensibly above or below some magic level or standard demonstrates faulty stewardship. We frequently see published reports of research expenditure expressed as a percentage of sales, such as 1, 3 or 5%. These are usually accompanied by comment as to the progressiveness or backwardness, as the case may be, of the particular industry or company. Actually, such figures have little or no significance. Any company has specific needs and opportunities for research. These needs and opportunities should be developed to the extent—but only to the extent—that worthwhile and timely objectives can be defined."

The experienced mishandler will have fixed in his mind a firm percentage figure with the result that as sales fluctuate so does the research budget. A particularly severe case of this kind came to our attention a few years ago in which the R&D budget rose from \$1-million a year to

\$4.5-million a year and fell again to less than \$1-million a year over a period of four years.

(3) *Demand that the research department show a "profit" and prove that research pays.*

This is a move certain to put the department on the defensive. Although no yardstick has yet been found that is acceptable to everybody, it is best to demand of the research director that he "prove" with figures that his budgets for the previous years are now paying off—generally at rates of over 100% in annual return. To do this requires the use of accounting figures — a mysterious art in which most research people are not well versed. The research director is then faced with two possibilities:

- (a) He can set up some mystical formula as a counter-attack and by using various factors in a rather impressive - appearing equation arrive at an answer which hopefully proves the point. In other words, he may devise a yardstick suited to *his* situation.
- (b) He can turn the whole thing over to the accounting department and the operating and sales groups and say to them that they should use their judgment on the value of the work done. In gamesmanship this has certain merit, but it can be dangerous if the others have prejudice.

Of course, neither system is going to work. The first because there is always some uncontrolled factor which upsets the equation, and the second because the credits conceded

by sales and production are not sufficiently generous. In our experience considerably ingenuity has been shown in a number of such situations, but we have always urged their elimination. We have felt that whenever a research director has been driven to this extreme means of justifying the existence of research, things are very definitely in a serious state of deterioration.

(4) *Install rigid systems to check hiring of new personnel, acquisition of new apparatus, construction of buildings, and travel — especially to technical meetings.*

At the same time when demands are being made to operate research at a profit and the budget is being arbitrarily doubled or halved, it is most desirable to control the research director so that he does not take too much into his own hands. If the company is large enough to have a director of personnel, director of purchasing, controller and chief engineer, these checks can be partly assigned to them and systems involving much paper work, red tape, constant justification, and argument can be installed. The result to an outsider would appear ridiculous in many cases, but it accomplishes the very definite result of mishandling the entire department. It indicates that the head of research is definitely not to be trusted, even in the area of his supposed competence. Thus, if the going rate of Ph.D.'s in his area is \$600 a month, it is wise to require ap-

proval of the president or possibly the Board of Directors to hire anyone above \$550 a month. On the other hand, if special apparatus is a necessary thing in a certain research program, it is desirable that anything costing more than \$50 require the approval of the executive vice president, with larger requests going on to the top management. This places the decision for such matters in the hands of those who know the least about it and thereby hampers the work in a very satisfactory manner.

Lest these remarks be considered incredible, I can say that we have observed examples of all of them — even to the point where supporting services, such as purchasing, personnel and finances have achieved such dominance that the technical group is bound hand and foot.

The provision for adequate quarters is less commonly used as harassment, since laboratories are themselves promotional devices and it is frequently found attractive to escort visitors past the research laboratory, pointing out the handsome quarters. Still, if really obsolete buildings and equipment are provided, it can be used as a method for lowering morale, if it is tucked away where the top management and visitors are in no position ever to see it.

Travel is a particularly successful way of mishandling people. In the first place, it is easy to control and in companies where large budgets are expended most freely on sales meet-

ings it is often found desirable to limit to a bare minimum the attendance at professional meetings. This creates a nice distinction between the types of travel; but a further restriction is ready at hand in the examination of petty details of the travel account. The disallowance of items as small as a dollar can be particularly effective as a way of upsetting the morale of a good research worker. While it must be fairly stated that research people have no more right to uncontrolled freedom than other employees, discriminating against them by treating them as second-class citizens is a sure way to reduce their effectiveness.

(5) *Establish a research and development committee as a device for majority decisions by the rest of management on the details of research programs.*

Very few companies can get along without this useful procedure. This consists of a forum in which all members of the committee chosen from the non-technical parts of the company can dominate the proceedings and in effect, direct or question in great detail all the items proposed by the technical director. If this committee includes the senior officers, so much the better, since their presence in general requires that one of them be chairman and this puts the research director very definitely on the defensive. It is commonly said that outside of the field of advertising there is no field with so many experts

in it as the direction of research. A committee of this kind is an excellent way of proving this point. It is questionable whether it is better to have committees of this kind which meet very regularly and keep a close hand over items in the program, or whether it is better to allow these meetings to become more and more infrequent with the whole committee dying a rather lingering death. Either device has been successfully used and will probably vary depending on the circumstances.

In one company, we observed the reverse side of this coin. There the research director had taken the initiative to start and sustain such a committee as an educational device and by slow degrees was undermining management misunderstanding and resistance. Perhaps this is too rare to justify recording, although it does suggest a technique not yet fully recognized.

(6) *Most importantly, fail to make a positive decision when a really new idea somehow emerges.*

In spite of all of the excellent mechanisms which have been suggested above, it may occur sometimes, either through inadvertence within the department or by the use of an outside consultant or some other device, that the research director comes up with a really new idea, one which appears to have sales possibilities. The fact that it is a new idea means that there is a certain risk involved. It may not, therefore, already have ap-

peared on the market, competitors may not have already shown that the thing is feasible, and so a decision which involves a certain risk must be taken. There are two good ways of handling this problem.

One is to procrastinate. If this is done, time will pass, the original idea will be found to need modification or more work as further comments are received from sales, production, etc., and possibly a competitor will spring into the picture thus making the decision much easier.

A second alternative is to make a decision, generally adversely, on the ground that too much capital is involved or that it does not fit the type of sales force available or similar reasons. There is a danger in taking this second course, because it may later turn out that competition will prove the decision to be absolutely wrong. There is, of course, a third way of handling the situation, but this is so unworthy it is not even recommended here. This is to just ignore the troublesome new idea or reject it without ever telling anyone.

(7) *Prevent the director from consulting with the heads of sales, production and finance.*

This can be easily done if the laboratory is located at any distance. It is then appropriate for the head of research to stay at the laboratory and direct the work there. Since he cannot be in two places at the same time, this means that when decisions are reached in the central office he is

generally not present. If these decisions happen to involve technical matters, it may be that he can be brought in for the purpose, but it is unlikely that he will have background or continuity of contact to be nearly as effective as if he remained on the spot. This tends to create a situation where the head of research is not on the same level with the other staff or operating heads. At the same time, he is not in daily contact — which allows the impression to spread that there is something wrong with the department, that it is probably not doing its job or that it is guilty of having an "ivory tower" attitude or some such similar criticism. The simplicity of this method of mishandling research has great deal to recommend it.

(8) *When merit raises, promotions, and salary advancements are considered, give greatest consideration first to the sales people, production people and others, and then last consideration to the technical people.*

This can be very demoralizing and naturally it will result in a steady flow of research people out of the laboratory into sales, production or even into competing companies. The result will be a mediocre department where only those who lack initiative to leave remain behind. The problems created for the research director are obvious. With mediocre people he will have great difficulty in maintaining the standards to be expected, which leads to still further discrimi-

nation in working conditions, etc., and the whole cycle is firmly established.

Since the quality of men in the end is the main asset of the research activity, this method of upsetting morale and so reducing quality can be most conclusive in its results. Some managements have at times superimposed the more drastic system of firing 10% or 20% of the technical department on a day's notice, but this is not recommended because it creates too much stir and gossip in the technical community and makes later hiring of people a real problem.

(9) *Insist on a budget which is primarily for service work, but always call it research.*

This sort of thing can be very easily done through ignorance, since the meaning of such words as service, development, research, pilot planting, etc., is fuzzy. Almost everyone has his own definition and a non-technical management can hardly be expected to be well informed on such intricacies. If all the expenditures are lumped together under the heading of research, it will be much more impressive to the stockholders. It will also be more difficult for the research director to explain in later years why the millions spent on "research" have not produced more wonderful, new products. Since no two companies will probably keep their books in the same way and the effort spent on real research will be

very much intermingled with other efforts of a more immediate necessity, it will be very hard to establish exactly what is being done or what should be done in this area. Quite possibly no research at all might fit the needs of some particular company or in other cases a considerable effort on really new items would be justified. This will never be apparent to the outside and possibly not to the inside, if all these technical things are lumped together. A device for further complicating the picture, but one which is now in rather poor repute, is to throw quality control into the research department as well.

* * * * *

The above nine points could probably be expanded considerably by comments on each of them and they could certainly be expanded in number. The general tone of the discussion has probably, however, by now created a feeling of cynicism which it is time to dispel.

Rather naturally, the answers to all of the objectionable procedures which have been discussed are clear to practically anyone who has had to deal with human beings. The fact that various companies suffer from some of these ailments in varying degrees is more a lack of realization of what is actually being done, rather than any deliberate desire to do it. It, however, does not mean that these errors are not rather commonly committed. In fact, in our experience one or more of them is

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probably to be found even in the most ideal relationship between research and management — in fact, has even been observed in our own company.

To summarize, I can do no better than to group the nine points into three sets of three and say that each one of these sets can be solved by application of the principles of Faith, Hope, and Charity.

Under Faith, it would be necessary for the management to state the objectives of the department, to provide stability for accomplishing them and to believe that research is worth the effort for its own sake.

Under Hope, it would be necessary for the management to give decisions when needed, to provide aid in every reasonable request of the department, and to provide understanding which will keep the spirit of the research team alive.

Under Charity, the management should treat the research head as an equal partner, insist upon the very best in good personnel relations, and be tolerant of the certainty that research people are unique.

Some Highlights of the Annual Meeting

Dr. Marvel Made Honorary Member

Those who receive the Gold Medal of the INSTITUTE are also made Honorary Members. So Dr. Carl S. Marvel, who received the 1955 Gold Medal of the INSTITUTE, was presented with a certificate of Honorary Membership by Dr. Lincoln T. Work, retiring chairman of the Board of Directors, at the conclusion of the Annual Business Meeting on May 12th. The citation on the certificate reads:

To Carl S. Marvel

Whose noteworthy and outstanding service to chemists through his inspired teaching for many years and through his noteworthy research in the field of organic chemistry has greatly enhanced our profession.

New Honorary Members Announced

At the Honor Recipient's Luncheon on May 13th, Mr. Lawrence H. Flett, former AIC president, who ably presided, announced that the Committee on Honorary Membership had selected Dr. Roy C. Newton, F.A.I.C., vice president in charge of scientific research, Swift & Co., Chicago, Ill., and Dr. Harry B. McClure, president, Carbide & Carbon Chemicals Co., New York, N. Y., to receive Honorary AIC Membership

at ceremonies to be arranged sometime during the fiscal year, 1955-1956. These dates will be announced later.

Dr. Manning Honored

Dr. Paul D. V. Manning, vice president of research and development, International Minerals & Chemical Corp., Chicago, Ill., was presented with Honorary AIC Membership, at the Honor Recipients' luncheon. John H. Nair of Thomas J. Lipton, Inc., Hoboken, N. J., spoke on Dr. Manning's career. Retiring AIC president, Dr. Donald B. Keyes, presented the certificate to Dr. Manning, who responded with a discussion on "The Chemist and His Personality." This presentation will be featured in the July issue of THE CHEMIST.

Proposed Bills Opposed

Proposed bills which would restrict the use of hypodermic syringes to the medical and allied professions were opposed by members of THE AMERICAN INSTITUTE OF CHEMISTS at its annual business meeting on May 12th. By resolution, they opposed any legislation, national, state, or local, which might restrict qualified chemists in the free exercise of their profession or in the free use of the tools of their profession.

Specifically, Senate Bill 72, by Senator Connors, and House Bill 86 by

Representative Robinson, had been introduced into the Illinois legislature, restricting the use of hypodermic syringes to the medical and allied professions. These bills were intended to enable authorities to control the illegal use of narcotics, but they did not take into account the fact that a great many chemists and other research scientists commonly use hypodermic syringes in their work. Similar legislation has been introduced into Pennsylvania and Connecticut, though the latter bill has already been defeated. Other scientific organizations have also opposed the Illinois bills.

Changes in the AIC Constitution

The Constitution of THE AMERICAN INSTITUTE OF CHEMISTS was amended by mail ballot by Fellows of the INSTITUTE this Spring to incorporate the following changes:

Rewrite Sections 2 and 3 of Article III to read:

Sec. 2. The officers shall be a President and a President-elect elected annually for a one-year term, and a Treasurer and a Secretary elected bi-annually for terms of two years. No person shall serve as President for more than two full terms.

Sec. 3. The President shall take office at the Annual Meeting immediately following or at which his election took place and shall hold office for one year. The President-elect shall succeed as President whenever a vacancy in the presidency occurs, and shall succeed to the presidency upon termination of the one-year term of the President. The Treasurer and Secretary shall take their respective offices



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at the Annual Meeting immediately following or at which their election took place and shall hold office for two years or until their successors qualify.

Add new Section 3 to Article IV as follows:

Sec. 3. The Board of Directors at their first meeting each year shall elect a Chairman who shall preside at all meetings of the Board.

Change Article V, Section 4, to delete the clause, "and the chairman of each such committee shall be at the time of appointment a member of the Council."

Working With People

This theme around which the papers presented at the Annual Meeting were oriented, has provided readers of THE CHEMIST with some fine material to study. No matter what the title of the paper, it contains ideas that can be put to use by every person who wishes to advance his status as a professional person through understanding. In this issue of THE CHEMIST, we have published as many of these articles as space permits. Others will appear in the July issue.

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Keyes Made Chairman of the Board

Dr. Donald B. Keyes, retiring AIC president, was elected chairman of the Board of Directors, at the board meeting held on the morning of May 13th. He succeeds Dr. Lincoln T. Work, who was chairman of the board during the fiscal year 1954-1955.

Congratulations to the Chicago Chapter

The Chicago AIC Chapter made the Thirty-second Annual Meeting, May 12-14, 1955, at the La Salle Hotel, Chicago, Ill., a memorable occasion. Arrangements were excellent; events were timed perfectly; hospitality was warm, and no surface ripples showed even when those little emergencies that occur in all plans for meetings everywhere appeared.

The Chicago Committees who achieved this happy record included: General Chairman, Dr. R. C. New-

ton; Chairman of Arrangements, Edward L. Gordy; Registration, Dr. Waldersee Hendrey and Dr. Herbert F. Schwartz; Co-chairman of Program Committee, Dr. Bernard S. Friedman; Treasurer, Dr. H. S. Bloch; Publicity, Frank C. Byrnes and Albert S. Hester, and the Ladies Committee consisting of Mrs. Lloyd A. Hall, chairman, Mrs. B. S. Friedman, and Mrs. H. S. Bloch. Early arrangements were initiated by Clifford A. Hampel. Dr. Lloyd A. Hall, chairman of the Chicago Chapter, coordinated all the activities.

Thank You!

To International Minerals & Chemical Corporation, Chicago 6, Ill., which sponsored cocktails preceding the Honor Recipients' Luncheon, on May 13th, in honor of Dr. Paul D. V. Manning.

To personal friends of Dr. Carl S. Marvel, who invited those who attended the Gold Medal Banquet on May 12th, to a reception in Dr. Marvel's honor preceding the dinner.

To the Cleveland Electric Illuminating Company, Cleveland 1, Ohio, who were hosts to Annual Meeting registrants at a film showing of the St. Lawrence Seaway, given on May 12th.

In Memoriam

The death of Dr. Gustav Egloff, Hon. AIC, on April 29, 1955, came as a shock to AIC members. He had

SOME HIGHLIGHTS . . .

been appointed Honorary Chairman of this Annual Meeting, and would have presided at the Honor Recipients' Luncheon. Resolutions in his honor were adopted at the Council Meeting on May 11th, and at the Annual Business Meeting on May 12th.

Dr. Hilton Ira Jones, F.A.I.C., also a prominent Chicago Chapter member, died May first. Appropriate resolutions were adopted at both the Council Meeting and at the Annual Business Meeting.

By-Products

Dr. Marvel's Degrees

Dr. Carl S. Marvel's secretary confessed that the last time she tried to total his honorary degrees, she counted 145 of them!

Future Chemical Executive

The three-year old son of Mr. and Mrs. Heinz R. Berlt, of Chicago, both AIC members, recently took his father's slide rule and carefully placed it under the arm of his teddy-bear. His mother, rescuing the slide rule, asked him, "Why did you give it to the teddy-bear?" He replied, in a tolerant tone, "So my teddy bear can figure out things!"

No Place for Speeches

One of the speakers at the Annual Meeting experienced several hours of worry when his suitcase was not unloaded from the plane in which he arrived at Chicago. Both the notes

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and the manuscript of his talk were in that suitcase! Fortunately, the suitcase came back on the return flight just an hour or so before he was to appear on the program.

Opportunities

Doris Eager, M.A.I.C.

AIC members who are seeking positions may place notices in this column without charge.

Positions Available

Head Textile Development Section; leading producer of acetate and viscose yarns, fabrics, plastic products and chemicals, to report to top management. Responsible for liaison with all phases of division's operations. Degree in Chemistry, Chemical Engineering or Textile Engineering. Minimum 10 years experience in synthetic textile manufacture with sales and market development in addition to technical background. Research or production experience. Age 35-45. Location New York, N. Y. Salary \$18,000 plus benefits. Box 61, THE CHEMIST.

Organic Chemist, Ph.D. or equivalent, minor in physical chemistry desired but not required. Synthesis of polymers in newly established laboratory of major manufacturer of textile glass fibers. Growth possibilities excellent. Box 63, THE CHEMIST.

Chemist: College graduate. Six months to one year's experience, preferably in food field. Bring resume. Hearst Magazines, 309 West 65th St., New York 19, N. Y.

Quality Control Manager. Degree in engineering, or equivalent, including statistical controls, procedures, systems and methods. 5-10 years' experience with multiple processes and products as manager, or assistant, of statistical quality control department in consumer goods; prefer paper converting. To design, install and supervise Quality Control and Inspection Departments. Chicago. Salary \$8,000-\$10,000. Box 65, THE CHEMIST.

Production Manager. Degree in engineering or equivalent, including industrial engineering techniques, industrial management and manufacturing processes. 5 to 10 years' experience in multiple processes and products as manager, or assistant, or production in consumer goods. Conversant with establishment and operations of product, processes and material planning, scheduling and handling. Chicago. Salary \$8,000-\$10,000. Box 67, THE CHEMIST.

General Manager of division active in mining, processing and selling industrial minerals. Responsible for directing operations, including supervision of three operating departments. Degree in engineering or master of business administration. Management experience in operations essential; cost control. Midwest. Salary around \$18,000 plus bonus. Box 69, THE CHEMIST.

Chemical Manufacturing Manager: To supervise manufacturing plant of old established chemical firm in Midwest. Will be responsible for about 1,000 men. Must have line experience in any chemical field including responsibility for maintenance. Age 45 to 55. \$20,000 range. Box 601, THE CHEMIST.

Chemists Available

Industrial Chemist. 20 years' experience in analytical, research and development—water, protective coatings, electroplating, isotopes, corrosion, petroleum products, miscellaneous organic and inorganic, ferrous and non-ferrous metallurgy. Age 43. Family. B.S. Desires technical service or sales liaison position. Box 60, THE CHEMIST.

Development Chemist. Applications Research. Seeks challenging position to make full use of administrative ability, scientific and business know-how in any of the major fields. Fifteen years progressively difficult experience; 9½ years director of a chemical laboratory conducting research-development, product evaluation, quality control. Box 62, THE CHEMIST.

Administration or Sales. 37, M.S. (Chemical Economics). Quadrupled efficiency of analytical laboratory, directed multi-plant expansion program which tripled dyestuff output; sold surplus chemicals which had been regarded unmarketable. Experienced writer and speaker. Prefer South, but will consider any location. Box 66, THE CHEMIST.

Chemist, 36, 11 years experience includes inorganic industrial work in batteries, electroplating, glues and gelatines, textile, and physical and chemical commercial testing; desires Middle Atlantic States location. Box 68, THE CHEMIST.

Marine Consultant, thoroughly familiar with requirements and problems in U.S.A., Central & South America and South East Asia. Eighteen years working experience and two additional years in Indonesia. Strong in marine fisheries engineering and development fields including gear, boats, engines, electronics, protective coatings, etc. Heavy experience in sales engineering, surveying marine markets to establish potentials, and in the preparation of working reports. Married, Harvard educated, willing to travel extensively or relocate. Desires immediate connection, available for interview anytime. Box 600, THE CHEMIST.

Progress: In Interlingua reported. The Interlingua Division of Science Service was organized as of April 1, 1953. Today, eleven medical journals publish all their abstracts in Interlingua. The first formal college course in this international language was offered by New York University this Spring.



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Vice President, John F. Williams

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Treasurer, Albert F. Parks

National Council Representative,

Paul E. Reichardt

Business Meeting

The Annual Business meeting of the Washington Chapter was held May 10, 1955, at a luncheon at O'Donnell's Restaurant, Washington, D.C. The officers listed above were elected for the 1955-1956 fiscal year.

New Jersey Chapter

Chairman, Dr. Cecil L. Brown

Chairman-elect, Dr. Max Bender

Secretary, Dr. Albert B. Scott

Merck & Company

Rahway, N. J.

Treasurer, Dr. William R. Sullivan

National Council Representative,

Dr. H. W. Mackinney

Election of Officers

Solomon Kaiser and Dr. F. R. Forrester, tellers for the election ballots of the New Jersey Chapter, report that the officers listed above were elected for the 1955-1956 fiscal year, and in addition, the following Chapter Councilors were chosen: J. E. Abel, Dr. C. Bamberger, Dr. R. Eck, Dr. E. R. Hanson, B. G. Hawkes, Dr. F. A. Lowenheim, R. H. Seavy and Dr. C. S. Sherman.

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Secretary, George Foy
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Treasurer, Robert R. Dean
National Council Representative,
John Kotrady

Annual Meeting

The new officers listed above were announced by John Kotrady, retiring chairman of the New York Chapter, at the Annual Honors Dinner, held June second at the Hotel Commodore, New York, N. Y. In addition to the officers, two members of the Chapter Council were elected for three-year terms: Dr. John Happel and Dr. E. J. Durham, both of New York University. At the meeting, the Annual Honor Scroll of the Chapter was presented to Dr. Henry B. Hass, president of Sugar Research Foundation, who spoke on "Stimulating Creative Thinking." This paper will appear in an early issue of THE CHEMIST.

Western Chapter

Chairman, Thomas J. Rollins
Chairman-elect, Dr. Frederick G. Sawyer
Vice President, Alfred J. Webber
Treasurer, Thomas Kehoe
Co-Secretaries: Gilbert E. Sinclair
1116 Hugo Reid Drive
Arcadia, Calif.
Donald K. Peterson
4128 W. 58th Place
Los Angeles 43, Calif.
National Council Representative:
Morris Katzman

Honors Meeting

The Western Chapter met May 19th to honor Dr. Arnold O. Beckman, founder and president of Beckman Instruments, Inc., for his distinguished contributions to the field of analytical chemistry. A full account of the presentation of the Honor Scroll to Dr. Beckman will appear in an early issue of THE CHEMIST.

In addition to the honor accorded Dr. Beckman, the Chapter presented student medals to twenty seniors graduating from Western colleges and universities. The seniors to be honored were chosen by their department heads as outstanding students in chemistry.

The newly elected officers listed above will serve for the current fiscal year.

Will You Come

June 2, 1955. New York Chapter. Honor Scroll Dinner. Hotel Commodore, New York 17, N. Y. Cocktails courtesy The Sugar Research Foundation. Dinner. Hon. Chairman, Dr. Raymond E. Kirk, F.A.I.C. Chairman, John Kotrady. Introduction of Dr. Henry B. Hass, F.A.I.C., by Dr. G. Bryant Bachman of Purdue University. Presentation of Honor Scroll to Dr. Hass, John Kotrady. Acceptance, "Stimulating Creative Thinking," Dr. Hass.

June 8, 1955. Chicago Chapter. Chicago Engineers Club. Annual Business Meeting. Reports of officers and committees. Revision of Constitution. Installation of new officers.

June 16, 1955. AIC Board of Directors and National Council. Luncheon 1:00 p.m. The Chemists' Club, 50 East 41st St., New York, N.Y. (Board meets at 12:30 p.m. Room C.)

May 9, 10, 11, 1956: AIC Annual Meeting. Hotel Statler, Boston, Mass. The New England Chapter will be host.

Appointed: Dr. Alvan T. Tenney as manager of market research of Carbide and Carbon Chemicals Company, New York 17, N. Y.

Chemical Books Abroad

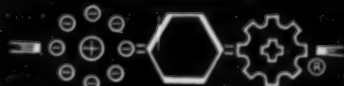
Rudolph Seiden, F.A.I.C.

Akademische Verlagsgesellschaft Geest & Portig, Leipzig C 1: *Kurzes Lehrbuch der Enzymologie*, by Th. Bersin; 4th ed., 336 pp. (44 ill.); DM 19.20—The general properties of enzymes and their uses; the enzymes as chemical individuals; and the role played by enzymes in breathing, nutrition, and metabolism are treated in this distinctive text and reference book.

The Pharmaceutical Press, London W C 1: *British Pharmaceutical Codex 1954*; 1340 pp.; 63 s.—Nearly a hundred experts have collaborated for five years to provide this authoritative account of the properties, uses, and dangers of all important drugs; of special interest is the formulary section (260 pp.). The book portrays the current status of pharmaceutical chemistry and industry. • *British Veterinary Codex*; 1953, 737 pp.; 45 s.—The standards for 430 drugs and 65 biological products used in veterinary medicine, a 116-page formulary, and a helpful therapeutic pharmacological index, in addition to 16 appendices, make this an indispensable volume for anyone connected with the production, distribution, or application of animal health products.

Duncker & Humblot, Berlin-Lichtenfelde-West: *Jahrbuch der gesamten Therapie* 1954, by Hans and Elsie Y. Braun; 712 pp.; DM 28.—More than 2000 abstracts of articles published in 1953 on new drugs, newest approved methods of treatment, and new facts about side effects of well-established therapeutical agents are compiled in this very useful annual; about 75% of the content is derived from German literature.

Johann Ambrosius Barth, Leipzig C 1: *Anorganisch - chemische Experimentierkunst*, by H. Lux; 1954, 651 pp. (358 ill.); paperbound DM 29.60—The working methods used in experimental inorganic chemistry are explained from chemical reaction as well as apparatus set-up points of view; thoroughly tested physical measuring methods are also described as far as they concern the determination of temperature, vapor, pressure, and melting point.



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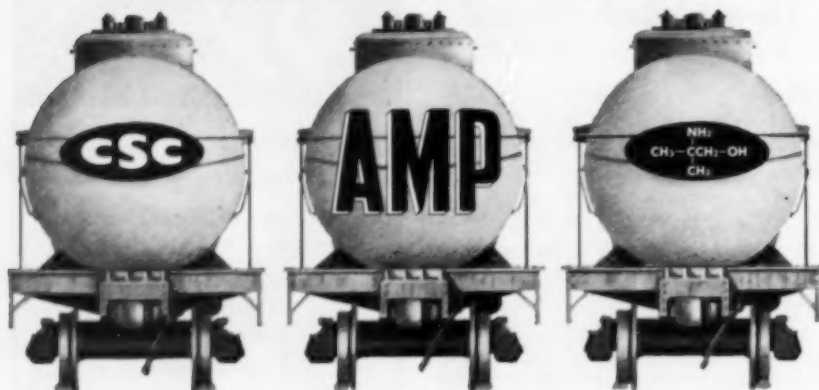


Elected: Dr. Robert Newell Dupuis, F.A.I.C., as vice president in charge of research of Philip Morris & Co., Ltd., Inc. He was formerly director of research and development of the company.

New Position: For David W. Young, F.A.I.C., who is now research associate for Sinclair Research Laboratories, Inc., Harvey, Ill. He was formerly with Standard Oil Development Company at Linden, N. J.

Promoted: Shepherd Stigman, M.A.I.C., to assistant director of personnel and public relations of Foster D. Snell, Inc., 29 West 15th St., New York 11, N. Y. He joined the organization in 1951 as chemist.

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pH of 0.1M Aqueous Solution at 20°C	11.3
Solubility in Water at 20°C, g/100 ml	Completely Miscible

SPECIFICATIONS

Neutral Equiv.	88.5-91.0
Color, APHA, max.	20
Water, by wt., max.	0.8%
Distill. Range	186°C - 177°C
Below 181°C max.	10%
Below 168°C max.	9%
Odor	Characteristic
Non-volatile matter by weight, max.	0.005%

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AEPD (2-Amino-2-ethyl-1, 3-propanediol)
 $\text{CH}_2\text{OHC}(\text{C}_2\text{H}_5)_2\text{NH}_2\text{CH}_2\text{OH}$

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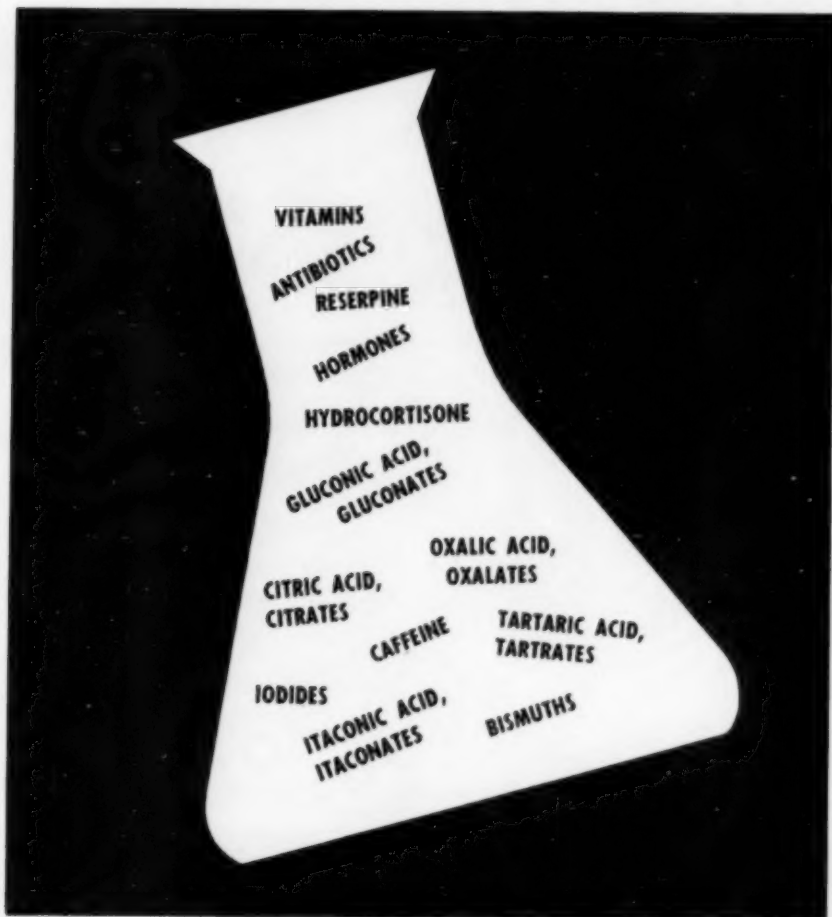
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That's basically why laboratories the world over use Tygon plastic tubing — insist on Tygon — refuse to accept tubing sold as "just as good as Tygon." For laboratory technicians know Tygon is the one tubing completely "neutral" — neither affecting nor being affected by virtually any solution they might use.

Add to this outstanding and proven quality: Glass-clearness, string-like flexibility, unmatched coupling ease, and an availability in a range of sizes to meet every need — and it's easy to see why TYGON is the accepted standard of laboratories everywhere.

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